

A novel system for measuring *in situ* rates of photosynthesis and respiration of kelp

Kirsten L. Rodgers*, T. A. V. Rees, Nick T. Shears

*Corresponding author: kirsten.rodgers@gmail.com

Marine Ecology Progress Series 528: 101–115 (2015)

Supplement.

A trial was carried out in the laboratory to determine the maximum incubation duration for this system. Adult *Ecklonia radiata* (n = 4) were individually incubated indoors in a 200 l tank (670 mm diameter x 830 mm depth) with irradiance provided by four 500 W halogen lights above the tank and varying shading over the tank producing three different light (photon flux density, PFD) levels (low 90, medium 180, and high 360 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$). At each light level the kelp were incubated in the chambers for a continuous 90 min period without flushing. Oxygen concentration was measured every minute, and photosynthetic rates were calculated over 10 min intervals. A 2-way ANOVA indicated that photosynthetic rates significantly differed among light levels ($p < 0.001$) and over time ($p < 0.001$) (Fig. S1). There was a general decline in rates after 40 min, but Holm-Sidak pair-wise multiple comparisons did not indicate significant differences from initial values (10–40 min) until after 80–90 min. However, due to the general decline after 40 min a conservative approach was taken where chambers were flushed after 40 min. In all field trials where chambers were flushed after 40 minutes there was no evidence of a declining rate of oxygen production.

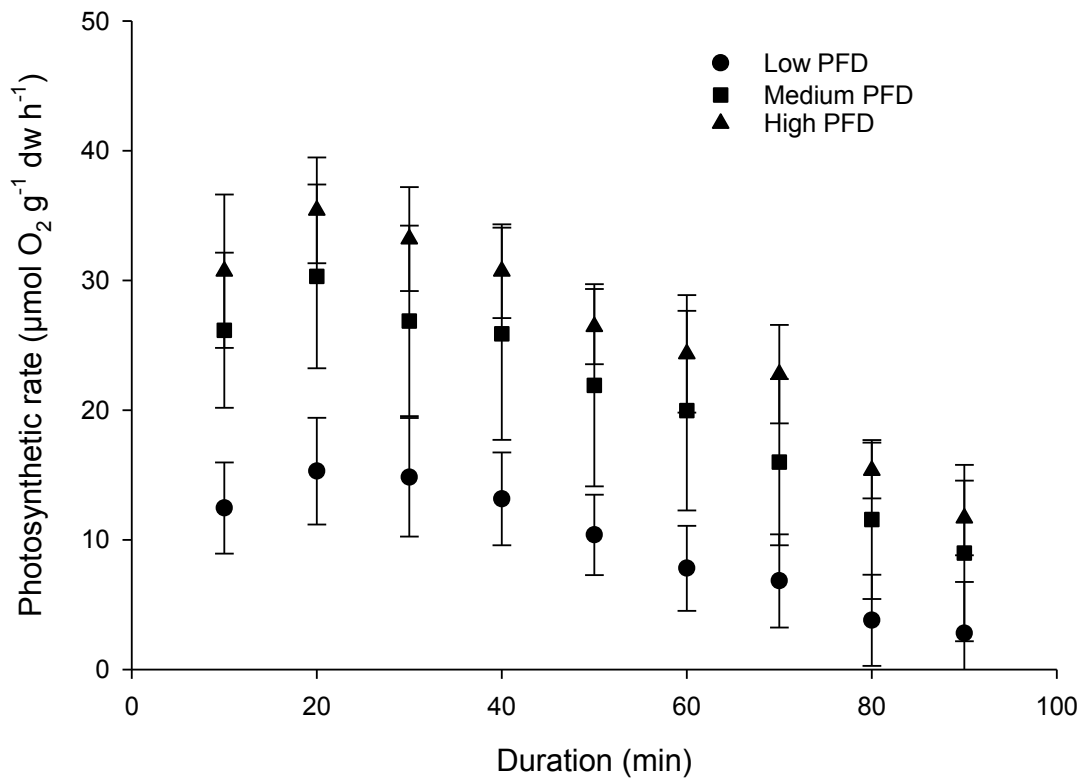


Figure S1. Mean (\pm SE) photosynthetic rate of *E. radiata* ($n = 4$) over the 90 minute duration of the incubation at low, medium and high PFD.